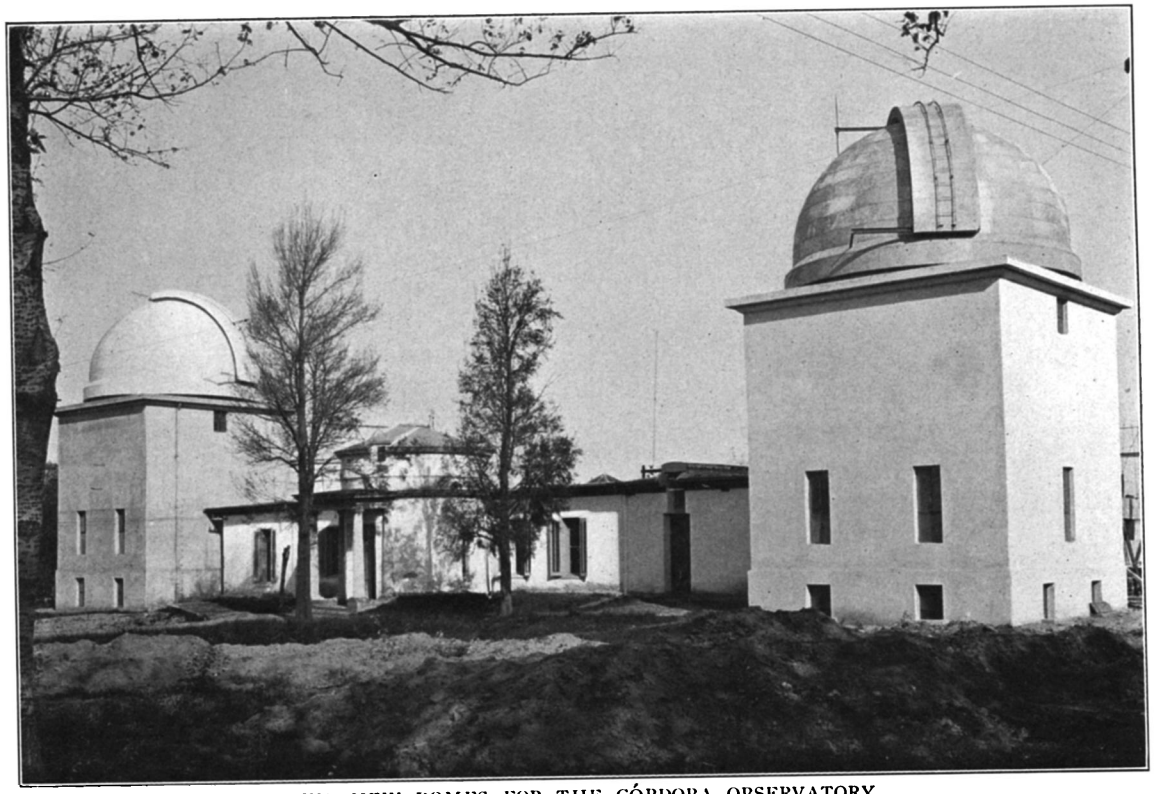

TWO NEW DOMES FOR THE CÓRDOBA OBSERVATORY.

TWO NEW DOMES FOR THE CÓRDOBA OBSERVATORY IN WHICH THE TELESCOPES ARE SUPPORTED BY THE WALLS.

By C. D. Perrine.

The 12-inch equatorial and the astrographic telescope as mounted in the original east and west domes were very close to the ground. When the new domes which had been provided for these telescopes were erected it was decided to put the telescopes higher in the air. In order to make available the space underneath, which was much needed, I adopted a square building and planned to rest the telescopes on the walls by means of concrete and iron beams.

Before beginning the construction, however, Messrs. Warner & Swasey were consulted as to such a telescope support. They unhesitatingly approved it.

Both buildings are square in section and are of concrete reinforced by iron beams and twisted bars or wire netting—the wire netting was used in the construction of the 12-inch dome, the twisted iron in the astrographic dome.

Each building contains a large basement room, and a room on the principal floor, unencumbered by piers of any sort, and an observing room above. Each is surmounted by a steel dome twenty-three feet in diameter constructed by the Warner & Swasey Co.

The buildings were so designed that the telescopes do not rest on piers, as in the older forms of construction, but their weights are carried by means of concrete and iron beams to the main walls of the buildings.

The 12-inch dome was built first, and the telescope support adopted was the following: The iron pier of the telescope rests directly upon two 10-inch I-beams about 2½ feet apart, north and south, the ends embedded in the walls, the space between filled in with concrete. Underneath the middle of these beams and bolted to them is a 10-inch I-beam running east and west, the ends embedded in the walls.

The walls for the astrograph have just been completed. The telescope support in this case is only slightly different, but in the nature of a further improvement. The essentially different point in this support is that smaller I-beams were used and that they were surrounded by concrete, thereby obtaining greater stiffness.

Owing to the fact that the astrographic telescope rests upon two piers, the construction had to be adapted to these conditions. This was done by putting a concrete beam 110^{cm} wide and 30^{cm} thick along the middle of the room from north to south and three interlocking beams east and west underneath —one in the middle, one near the north and one near the south wall—the two latter under the feet of the two piers which support the polar axis. These east and west beams are 45^{cm} wide by 30^{cm} high.

The floors of the observing-rooms in both cases are entirely independent of these supporting beams, except that the walls finally carry both. In any situation where there are heavy winds at night there would probably be vibrations of the walls sufficient to communicate to the telescope. At this observatory, however, we never have any high night winds except during storms, when observing is impossible for other reasons, and usually the nights are perfectly still, so there was no fear of such a supporting system as that described above on account of wind.

The 12-inch telescope has now been in use in its new position for over a year and we have been able to judge of the suitability of such a method of support.

Heavy walking on the floor causes vibrations which are communicated to the telescope enough to make the image of a star vibrate two or three seconds of arc. Reasonable care, however, prevents noticeable vibration. Under the conditions in which the usual micrometer work is done, no unsteadiness whatever is noticed. I have several times observed with winds of ten to fifteen-miles velocity, but have never detected any vibrations. In the heavy storm winds there is a slight trembling. Concrete beams like those used in the astrographic dome should considerably decrease these vibrations. If they were still objectionable a slender iron column could be placed underneath the center of

the beam and pier extending to the ground. This would probably practically eliminate them.

Another method of eliminating floor vibrations would be to put a moderately flexible covering over the concrete floor, such as carpet or cocoa matting.

The economy of space in the rectangular construction is very great, especially in the case of small domes. Such a form also permits of more convenient and economical arrangement of stairways, entrances, etc., in the attached buildings.

The stability of this system of support appears to be as good for locations where high winds are not prevalent, as the old form of isolated pier, especially if the telescope is at a considerable height above the ground. A modified form of this construction could be used in locations having high winds. In the matter of cost, there is a marked saving where only first-class construction is considered.

In another place[1] I have described the effect of a stroke of lightning on one of these domes.

The following details are added for the benefit of those considering similar construction:—

The foundation walls are 90^{cm} in width, resting on hard earth. The basement walls are 40^{cm} in thickness and the two main stories 25^{cm}. In the astrographic dome, owing to the two piers being so close, the north wall and the south wall are each 30^{cm} thick. The walls are 10^{m} high, including the foundation.

The ceilings of the rooms underneath the observing-rooms are without openings and are well plastered to prevent currents of air rising into the observing room.

It was found in the old astrographic dome that if the door leading from the main building was opened even for a few minutes the star images were considerably enlarged in average seeing. The practice was therefore adopted of keeping all doors and windows shut during the actual observing. The windows and doors of the new domes, including their frames, are of iron and the floors are tile or cement.

Preliminary experiments indicate satisfactory freedom from vibration.

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[1] See these *Publications*, **26**, 162, 1914.